Chapter 1. Introduction and Background

Introduction

The Sacramento River National Wildlife Refuge (Refuge) is located in the Sacramento Valley of north-central California and was proposed to acquire 18,000 acres from Red Bluff to Colusa. The Refuge currently meanders along 77 miles of California's largest waterway, the Sacramento River, between Red Bluff and Princeton (Figure 1). Its many units are located along both sides of the river and serve to protect and provide a wide variety of riparian habitats for birds, fish, and other wildlife. The Refuge is one of many partners protecting and restoring riparian habitat along the Sacramento River and its watershed.

This document is a Comprehensive Conservation Plan (CCP) designed to guide management of the Refuge for the next 15 years. Guidance within the CCP will be in the form of goals, objectives, strategies, and compatibility determinations. The purposes of this CCP are to:

- Provide a clear statement of direction for the future management of the Refuge;
- Provide long-term continuity in Refuge management;
- Communicate the U.S. Fish and Wildlife Service's (Service) management priorities for the Refuge to their partners, neighbors, visitors, and the general public;
- Provide an opportunity for the public to help shape the future management of the Refuge;
- Ensure that management programs on the Refuge are consistent with the mandates of the National Wildlife Refuge System (Refuge System) and the purposes for which the Refuge was established;
- Ensure that the management of the Refuge is consistent with Federal, State, and local plans; and
- Provide a basis for budget requests to support the Refuge's needs for staffing, operations, maintenance, and capital improvements.

This CCP provides a description of the desired future conditions on the Refuge and long-range guidance to accomplish the purposes for which the Refuge was established. The CCP and accompanying Environmental Assessment (EA) address Service legal mandates, policies, goals, and National Environmental Policy Act (NEPA) compliance. A range of administrative, habitat management, and

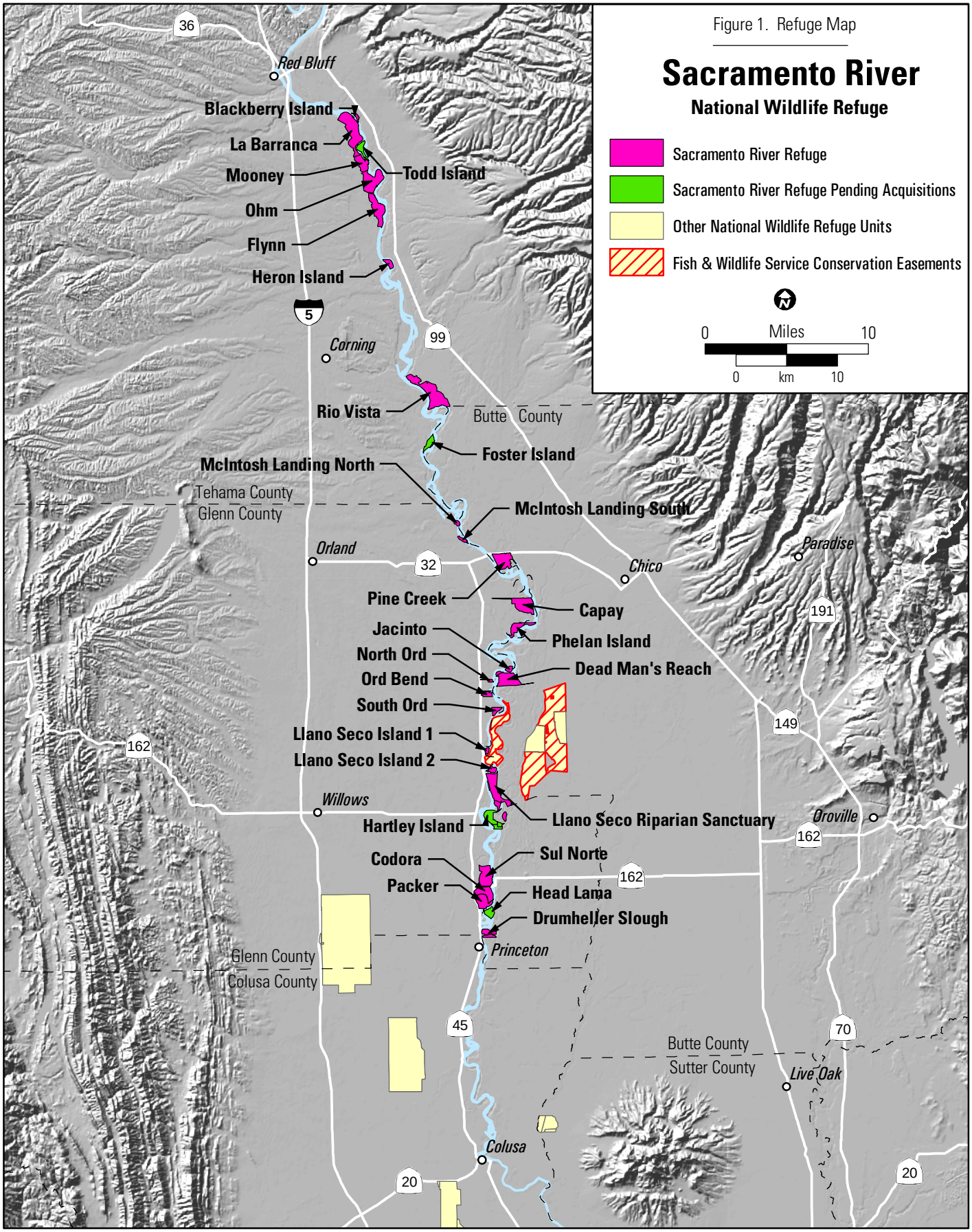


Figure 1. Refuge Map
Sacramento River
National Wildlife Refuge
Sacramento River Refuge
Sacramento River Refuge Pending Acquisitions
Other National Wildlife Refuge Units
Fish & Wildlife Service Conservation Easements
0 Miles 10
0 km 10
Red Bluff
Blackberry Island
La Barranca
Mooney
Todd Island
Ohm
Flynn
Heron Island
Corning
Rio Vista
Butte County
Foster Island
McIntosh Landing North
Tehama County
Glenn County
McIntosh Landing South
Orland
Chico
Paradise
Pine Creek
Capay
Jacinto
Phelan Island
North Ord
Dead Man's Reach
Ord Bend
South Ord
Llano Seco Island 1
Llano Seco Island 2
Willows
Hartley Island
Llano Seco Riparian Sanctuary
Oroville
Codora
Sul Norte
Packer
Head Lama
Drumheller Slough
Princeton
Glenn County
Colusa County
Butte County
Sutter County
Live Oak
Colusa
36
5
99
32
191
149
162
45
70
20

visitor services alternatives that consider issues and opportunities on the Refuge were analyzed in the draft EA (Appendix A). This document presents the Service's plan for future management of the Refuge.

The CCP is accompanied by four new plans: a Hunting Plan (Appendix C), Fishing Plan (Appendix D), Fire Management Plan (Appendix E), and Integrated Pest Management Plans (Appendices P & Q). Other existing plans that will remain in place include a Habitat Management Plan, Cultural Resource Management Plan, and Restoration and Enhancement Plan.

The CCP serves as a management tool for the Refuge staff. It will guide management decisions, and describe strategies for achieving Refuge goals and objectives over a 15-year period. It is divided into six chapters: Chapter 1, Introduction; Chapter 2, Planning Process; Chapter 3, Refuge Environment; Chapter 4, Current Refuge Management and Programs; Chapter 5, Planned Refuge Management and Programs; and Chapter 6, Plan Implementation.

Need for This CCP

The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) (Improvement Act) requires that all Federal refuges be managed in accordance with an approved CCP by 2012. This plan provides the necessary guidance as the Refuge has no integrated plan that guides the management of all of its resources and uses. The Service has prepared this CCP to meet the dual needs of complying with the Improvement Act and providing long-term integrated management guidance for the Refuge.

Legal and Policy Guidance

National Wildlife Refuges are guided by the mission and goals of the Refuge System, purposes of the Refuge, Service policy, laws, and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the Improvement Act, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual. The Refuge Recreation Act of 1962, as amended, authorized the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use when such uses did not interfere with the area's primary purpose.

The Improvement Act:

- Identified a new mission statement for the Refuge System;
- Established six priority public uses (hunting, fishing, wildlife observation and photography, environmental education and interpretation);
- Emphasized conservation and enhancement of the quality and diversity of fish and wildlife habitat;
- Stressed the importance of partnerships with Federal and State agencies, Tribes, non-governmental organizations, industry, and the general public;
- Mandated public involvement in decisions on the acquisition and management of refuges; and
- Required, prior to acquisition of new refuge lands, identification of existing compatible wildlife-dependent uses that would be permitted to continue on an interim basis pending completion of comprehensive conservation planning.

The Improvement Act establishes the responsibilities of the Secretary of the Interior for managing and protecting the Refuge System; requires a CCP for each refuge by the year 2012; and provides guidelines and directives for the administration and management of all areas in the Refuge System, including wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.

The Improvement Act also establishes a formal process for determining whether uses are "compatible" with the refuge's purposes. Federal law requires that before any uses, including priority public uses, are allowed on the refuge, a compatibility determination must be made. A compatible use is defined as a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the purposes of the refuge. Sound professional judgment is defined as a finding, determination, or decision that is consistent with the principles of sound fish and wildlife management and administration, available science and resources (funding, personnel, facilities, and other infrastructure), and applicable laws. The Service strives to provide priority public uses when they are compatible. If financial resources are not available to design, operate, and maintain a priority use, the refuge manager will take reasonable steps to obtain outside assistance from the State and other conservation interests. Compatibility determinations are included in this document (Appendix B). These were finalized at the same time as the CCP.

In addition, the Improvement Act directs the Service to "ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans..." The policy is an additional directive for refuge managers to follow while achieving Refuge purpose(s) and System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on Refuges and associated ecosystems. Further, it provides refuge managers with an evaluation process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate and in concert with refuge purposes and System mission, restore lost or severely degraded components. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuges' contribution to biological integrity, diversity, and environmental health at multiple landscape scales.

While the Refuge System mission and the purposes for which the Refuge was established provide the foundation for management, National Wildlife Refuges are also governed by other Federal laws, Executive Orders, treaties, interstate compacts, regulations and conservation initiatives pertaining to the conservation and protection of natural and cultural resources (Appendix M). Some of these include: Floodplain Management (EEO 11988), Protection of Wetlands (EO 11990), Management of General Public Use of National Wildlife Refuge System (EO 12996), Environmental Justice in Minority Populations and Low-Income Populations (EO 12898), Endangered Species Act of 1973, as amended, Emergency Wetlands Resources Act of 1986, Fish and Wildlife Act of 1956, National Historic Preservation Act of 1966, as amended, Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186), Migratory Bird Treaty Act of 1918, the Fish and Wildlife Conservation Act of 1980, as amended, Neotropical Migratory Bird Conservation Act of 2000, North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, Riparian Bird Conservation Plan (Riparian Habitat Joint Venture / California Partners in Flight), North American Bird Conservation Initiative, and the North American Waterbird Conservation Plan.

The U.S. Fish and Wildlife Service

The mission of the Service is: "working with others to conserve, protect, and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people."

The Service is the primary Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. Although the Service shares this responsibility with other Federal, State, Tribal, local, and private entities, the Service has specific responsibilities for migratory birds, threatened and endangered species, anadromous and interjurisdictional fish, and certain marine mammals. These are referred to as Federal trust species. The Service also manages the Refuge System, national fish hatcheries, enforces Federal wildlife laws and international treaties on importing and exporting wildlife, assists State fish and wildlife programs, and helps other countries develop wildlife conservation programs.

The National Wildlife Refuge System

The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and ecosystem protection. The Refuge System consists of over 540 national wildlife refuges that provide important habitat for native plants and many species of mammals, birds, fish, and threatened and endangered species. The mission of the Refuge System, as stated in the Improvement Act, is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (Improvement Act, 1997).

Gadwall
Photo by Steve Emmons

The goals of the Refuge System are to:

- Preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered;
- Perpetuate the migratory bird resource;
- Preserve a natural diversity and abundance of fauna and flora on refuge lands; and
- Provide an understanding and appreciation of fish and wildlife ecology and the human role in the environment and to provide refuge visitors with high-quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent that these activities are compatible with the purposes for which the refuge was established.

In addition, the guiding principles of the Refuge System are:

- We are land stewards, guided by Aldo Leopold's teachings that land is a community of life and that love and respect for the land is an extension of ethics. We seek to reflect that land ethic in our stewardship and to instill it in others;
- Wild lands and the perpetuation of diverse and abundant wildlife are essential to the quality of the American life;
- We are public servants. We owe our employers, the American people, hard work, integrity, fairness, and a voice in the protection of their trust resources;
- Management, ranging from preservation to active manipulation of habitats and populations, is necessary to achieve Refuge System and U.S. Fish and Wildlife Service missions;
- Wildlife-dependent uses involving hunting, fishing, wildlife observation, photography, interpretation, and education, when compatible, are legitimate and appropriate uses of the Refuge System;
- Partnerships with those who want to help us meet our mission are welcome and indeed essential;
- Employees are our most valuable resource. They are respected and deserve an empowering, mentoring, and caring work environment; and
- We respect the rights, beliefs, and opinions of our neighbors.

The Sacramento National Wildlife Refuge Complex

For thousands of years the Sacramento Valley has provided a winter haven for ducks, geese, and swans. Waterfowl migrate here by the millions from as far away as the Arctic regions of Alaska, Canada, and Siberia. The five national wildlife refuges and three wildlife management areas of the Sacramento Refuge Complex represent an island of habitat in a sea of Sacramento Valley agriculture. This

valley represents one of the most important wintering areas for waterfowl along the Pacific Flyway.

The Sacramento National Wildlife Refuge Complex (Complex) represents a small portion of the vast seasonal wetlands and grasslands that once existed in the Sacramento Valley. Millions of waterfowl migrated south in the Pacific Flyway to winter in the valley among resident waterbirds, deer, elk, pronghorn, and grizzly bear. With the development of agriculture during the late 1800's and early 1900's, natural habitat was replaced with rice and other crops. Waterfowl substituted these farm crops for their original wetland foods, causing serious crop losses for farmers.

Today, 95 percent of California's wetlands are gone, along with the pronghorn and grizzly bear. Constructed levees now confine the river for irrigation and flood control, preventing the natural flooding and formation of new wetlands. Despite these changes, the birds continue to fly their ancient migration routes along the Pacific Flyway and crowd into the remaining wintering habitat. The Refuges provide a significant amount of the wintering habitat that supports waterfowl and other migratory birds in the Sacramento Valley.

Four of the five refuges of the Complex are almost entirely human made. In 1937, when Sacramento National Wildlife Refuge was established, managers and biologists worked to transform many of the Refuge's dry, alkaline lands into productive managed marshes. Additional Refuges were created in the 1950's through the 1980's, forming the Sacramento Refuge Complex.

Four of the five Refuges were created to provide wintering habitat for waterfowl and reduce crop damage. These Refuges--Sacramento, Delevan, Colusa, Sutter, and Butte Sink National Wildlife Management Area--consist of wetland, grassland, and riparian habitats. The Refuge staff maintains more than 32,000 acres of wetlands and uplands on the Complex. Water regimes are managed to mimic the Sacramento River's historic flood cycle. The Refuges' seasonal marshes are drained during late spring and summer to encourage plant growth on the moist, exposed soil. Re-flooding in the fall makes seeds and plants available for wildlife. Water management, prescribed burns, discing, and mowing are some of the techniques used to create and maintain wetland habitats.

The fifth Refuge, Sacramento River Refuge, was established in 1989 to help protect and restore riparian habitat along the Sacramento River as it meanders through the Sacramento Valley from Red Bluff to Colusa.

The Sacramento River National Wildlife Refuge

Sacramento River Refuge is located in the Sacramento Valley of north-central California and is part of the Sacramento Refuge Complex (Figure 1). The Refuge was established in 1989 by the authority provided under the Endangered Species Act of 1973, Emergency Wetlands Resources Act of 1986, and the Fish and Wildlife Act of 1956. The Service proposed acquisition of up to 18,000 acres of land to establish the Sacramento River Refuge (USFWS 1989). The area considered for acquisition is primarily located in the Sacramento River's 100-year meander zone between Red Bluff and Colusa, in Tehama, Butte, Glenn, and Colusa counties (Figure 1). The Refuge is currently composed of 26 properties (units) along a 77-mile stretch of the Sacramento River between the cities of Red Bluff and Princeton (Table 1). Though adjacent to the Sacramento River Refuge, the Llano Seco Unit and Llano Seco Unit Sanctuary (Figure 1) were acquired through a separate authority, the North American Wetlands Conservation Act of 1989, and are considered part of the North Central Valley Wildlife Management Area. Therefore, the Llano Seco Unit and Llano Seco Unit Sanctuary and the conservation easements east of Angel Slough on Llano Seco are not evaluated in this plan. These units and easements will be included in the CCP separately developed for the North Central Valley Wildlife Management Area.

As of June 2005, the Refuge consisted of 10,304 acres of riparian and agricultural habitats owned by the Service and 1,281 acres of riparian habitats in conservation easement owned by Llano Seco Ranch. Riparian and agricultural habitats at the Refuge include sand and gravel bars, willow scrub, cottonwood forest, herblands, mixed riparian forest, valley oak woodlands and savannas, grasslands, freshwater wetlands, pastures, cover crops (i.e., winter wheat, safflower, corn, bell beans), almond and walnut orchards.

Sacramento River
Photo by Greg Golet

Table 1. Sacramento River National Wildlife Refuge: Location and Size, June 2005[1].

Refuge Unit Name	River Mile	County	Acres	Date Acquired
La Barranca	239R	Tehama	1,066	1989, 1991
Blackberry Island	239L	Tehama	52	2002
Todd Island[2]	238R	Tehama	185	BLM owned
Mooney	236R	Tehama	342	1994
Ohm	234R	Tehama	757	1989, 1991
Flynn	232R	Tehama	630	1990, 1998
Heron Island	228L	Tehama	126	1990
Rio Vista	217L	Tehama	1,149	1991
Foster Island[2]	211R	Glenn	174	BLM owned
McIntosh Landing North	202R	Glenn	63	1994
McIntosh Landing South	201R	Glenn	67	1994
Pine Creek	199L	Butte	564	1995, 2003
Capay	194R	Glenn	666	1999
Phelan Island	191R	Glenn	308	1991
Jacinto	187R	Glenn	69	1996
Dead Man's Reach	186L	Butte/Glenn	637	1999
North Ord	185R	Glenn	29	2002
Ord Bend	184R	Glenn	111	1995
South Ord	182R	Glenn	122	1999
Llano Seco Riparian Sanctuary and Islands	177L/R	Butte	906	1991
Hartley Island[3]	173L	Butte	487	2004 (67 acres), 420 acres privately owned
Sul Norte	168R	Glenn	590	1990, 1991
Codora	167R	Glenn	399	1994
Packer	168R	Glenn	404	1997
Head Lama[3]	166L	Glenn	177	Privately owned
Drumheller Slough	165L	Glenn	224	1998, 1999
Refuge Total Fee Acres			**10,304**	
Llano Seco Riparian Easement	*138L*	*Butte*	*1,281*	*1991*

[1] Acres represent original acquired acres and do not indicate eroded and accreted land. [2] Currently owned by BLM and included in total refuge acreage. [3] Privately owned and in acquisition process (included in total acreage).

The Great Central Valley, which encompasses the Sacramento Valley, is an extensive agricultural area that was once characterized by diverse types of natural vegetation that provided habitat for a great number of plant and animal species. Most of the streams and tributaries supported Chinook salmon runs, the forests were important songbird breeding areas, and the wetlands were major waterfowl wintering areas. Currently, lands that surround the Refuge mostly consist of orchards and irrigated rice lands with some livestock, safflower, barley, wheat, and alfalfa crops. Topography is flat with a gentle slope to the south. The predominant soil type occurs in mixed alluvium and includes fluvial gravel and sands and various Columbia loams.

Numerous plans and initiatives have identified riparian habitat along the Sacramento River as critically important for various endangered and threatened species, fisheries, migratory birds, plants, and to the functional processes of the river ecosystem. There has been an 85 percent reduction of riparian vegetation throughout the Sacramento Valley and foothills region, and probably in excess of a 95 percent reduction along this area's major river systems (Thompson 1961). The relatively small amount of remaining riparian forest provides a strikingly disproportionate amount of habitat value for wildlife when compared with what is needed for healthy fish and wildlife populations. The Refuge was established to preserve, restore, and enhance riparian habitat for threatened and endangered species, breeding and wintering migratory birds, anadromous fish, resident species, and native plants. The Refuge is managed to maintain, enhance and restore habitats for these species. To the extent possible, habitat is managed for natural diversity of indigenous flora and fauna. Riparian forests are being restored by converting flood-prone agricultural lands along the Sacramento River in cooperation with The Nature Conservancy (TNC), River Partners (RP), and local farmers.

Public access is currently limited to the Todd and Foster Island units (BLM properties currently in the acquisition process) and the Packer Unit. Currently, all types of river access recreational uses are allowed on Todd and Foster Islands under the multiple use polices of BLM. The Packer Unit provides an unimproved access point for bank fishing and small boat access to Packer Lake.

Refuge Units

The Refuge is comprised of 26 different units, each having its own specific projects and management needs. Though some units are adjacent to one another, most are geographically separate. Some units solely consist of pre-existing native riparian habitats; some are being restored to riparian habitats, while others may remain in agricultural production until restoration plans can be finalized. A brief summary of size, location, and composition of each unit can be found in the Refuge Unit Descriptions section of Chapter 3.

Land Acquisition

The area approved for acquisition to meet the 18,000-acre goal of the Refuge is located along the Sacramento River, generally within the 100-year meander zone, between Red Bluff and Colusa, as outlined in the Middle Sacramento River Refuge Feasibility Study (USFWS 1987) and the Environmental Assessment–Proposed Sacramento River National Wildlife Refuge (USFWS 1989). Acquisition is conducted on a willing-seller basis only. The refuge staff evaluates the properties to determine if the land will help to meet the conservation goals and objectives of the Refuge. Appraisals are done in accordance with standard appraisal procedures in order to determine fair market value of the proposed area. The appraisers are contracted by the Service. The approved appraisal is the basis upon which negotiations with the landowner and a Realty Specialist are initiated. If the landowner agrees and is willing, the Service will offer to purchase the property depending on funding availability. Funding typically comes from the Land and Water Conservation Fund (LWCF), CALFED program, or private donations. The history of land acquisition on the Refuge is illustrated in Table 1.

Oil and Gas Extraction

There is one natural gas well located within the boundaries of the Sacramento River Refuge. The well is located on the Sul Norte Unit, where it has operated until recently. As part of the transfer agreement, private interests retained the mineral rights. Access to and operation of the gas well is regulated by the refuge manager by special conditions set forth in a Special Use Permit required under the title agreement.

Refuge Purposes

The Service acquires Refuge System lands under a variety of legislative acts and administrative orders. Usually the transfer and acquisition authorities used to obtain the lands have one or more purposes for which land can be transferred or acquired. These purposes, along with the Refuge System mission, form the standard for determining if proposed refuge uses are compatible.

Sacramento River
USFWS Photo

The Refuge purposes are:

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. 742f (a) (4)
"... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

The Refuge Vision

A vision statement is developed or revised for each individual refuge unit as part of the CCP process. Vision statements are grounded in the unifying mission of the Refuge System, and describe the desired future conditions of the refuge unit in the long term (more than 15 years), based on the refuge's specific purposes, the resources present on the refuge, and any other relevant mandates. This CCP incorporates the following vision statement for the Sacramento River Refuge.

> "The Sacramento River National Wildlife Refuge will create a linked network of up to 18,000 acres of floodplain forests, wetlands, grasslands, and aquatic habitats stretching over 100 miles from Red Bluff to Colusa. These refuge lands will fulfill the needs of fish, wildlife, and plants that are native to the Sacramento River ecosystem. Through innovative revegetation, the Refuge will serve as an anchor for biodiversity and a model for riparian habitat restoration throughout the Central Valley. We will forge habitat, conservation, and management links with other public and private conservation land managers.
>
> The Sacramento River National Wildlife Refuge is committed to the preservation, conservation, and enhancement of a quality river environment for the American people along the Sacramento River. In this pursuit, we will work with partners to provide a wide range of environmental education programs and promote high quality wildlife-dependent recreational opportunities to build a refuge support base and attract new visitors. Compatible wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation and photography, environmental education and interpretation will be provided on the Refuge.
>
> Just as the floodplain along the Sacramento River has been important to agriculture, it is also an important natural corridor for migratory birds, anadromous fish, and threatened and endangered species. Encouraging an understanding and appreciation for the Sacramento River will be a focus of the Sacramento River National Wildlife Refuge for generations to come."

Existing and New Partnerships

In "Fulfilling the Promise" (USFWS 1999) the Service identified the need to forge new and non-traditional alliances and strengthen existing partnerships with States, Tribes, non-profit organizations and academia to broaden citizen and community understanding of and support for the National Wildlife Refuge System. The Service recognizes that strong citizen support benefits the Refuge System. Involving citizen groups in Refuge resource and management issues and decisions helps managers gain an understanding of public concerns. Partners yield support for Refuge activities and programs, raise funds for projects, are activists on behalf of wildlife and the Refuge System, and provide support on important wildlife and natural resource issues.

A variety of people including, but not limited to, scientists, birders, anglers, hunters, farmers, outdoor enthusiasts and students are keenly interested in the management of Sacramento River Refuge, its fish and wildlife species, and its plants and habitats; this is illustrated by the number of visitors the Refuge receives and the partnerships that have already developed. New partnerships will be formed with interested organizations, local civic groups, community schools, Federal and State governments, and other civic organizations as funding and staff become available.

The Service is a signatory to a Memorandum of Agreement (MOA) between local, State and Federal agencies involved with riparian habitat restoration. The MOA is the result of years of effort and is focused on implementing the Sacramento River Conservation Area Handbook. The Handbook addresses both the biological basis and the institutional framework for restoration work along the river and builds on the concepts originally set forth in the 1989 Upper Sacramento River Fisheries and Riparian Habitat Management Plan, prepared under California State Senate Bill 1086. The Sacramento River Refuge is included within the geographic area and the refuge staff coordinates activities with the non-profit Sacramento River Conservation Area Forum.

The Sacramento River Refuge has a Memorandum of Understanding (MOU) with the California Department of Fish and Game (CDFG) and the California Department of Parks and Recreation (CDPR) for cooperative land management along the Sacramento River (USFWS et al 2001). The purpose of the MOU is to formally document an agreement to mutually manage, monitor, restore, and enhance lands managed for fish, wildlife, and plants along the Sacramento River in Tehama, Butte, Glenn, and Colusa counties. An additional purpose is to regularly communicate between agencies to prevent duplicating or

prescribing conflicting land management and acquisition efforts. The affected area includes all lands owned and managed as the Sacramento River Refuge, Sacramento River Wildlife Area, and State Parks located along the Sacramento River in the designated counties. These lands have been identified in several documents as providing essential habitat for numerous species of fish and wildlife including many threatened and endangered species. The Service, Department, and State Parks mutually agree to manage these lands for the conservation of biological, cultural, and scenic values, and for promoting compatible wildlife-dependent recreational opportunities. The Sacramento River Refuge has entered into Cooperative Land Management Agreements (CLMA) with TNC, River Partners, Ohm, and Llano Seco Rancho for selected units within and adjacent to the Refuge. The CLMA agreements are authorized by the Code of Federal Regulations as follows: "Cooperative agreements with persons for crop cultivation, haying, grazing, or the harvest of vegetative products, including plant life, growing with or without cultivation on wildlife refuge areas, may be executed on a share-in-kind basis when such agreements are in aid of or benefit to the wildlife management of the area" (50 CFR 29.2).

The Service and the Refuge also have agreements with the California Department of Forestry and Fire Protection and several volunteer fire departments to assist with fire suppression on refuge lands.

The Refuge is part of a mosaic of public and private land along the Sacramento River corridor. To maximize conservation efforts along the river, the Refuge has coordinated its CCP process with other ongoing planning efforts. This includes participating on the steering committee for CDFG's Sacramento River Wildlife Area Comprehensive Management Plan. In addition the Refuge coordinated with the CDPR's plan for Bidwell-Sacramento River State Park. Coordination with these agencies, Refuge partners (Table 2), and the local community was vital during the preparation of the CCP and will continue to be important in the ongoing management of the Refuge.

Table 2. Partnerships in habitat acquisition, restoration, and management.

Partner Organization Name	Areas of Expertise / Information and Services Provided
U.S. Fish and Wildlife Service [1]	National Wildlife Refuge management and science, endangered species conservation, land acquisition, habitat restoration funding, and migratory bird management
The Nature Conservancy [2]	Land acquisition, agricultural lands management, riparian restoration, land stewardship and science, cooperative land management at Llano Seco
River Partners [2]	Agricultural lands management, riparian restoration, land stewardship and science
California State University, Chico [3]	Natural and cultural resources science through professional experts, professors, and graduate students
Natural Resources Conservation Service, Chico Soil Survey [1]	Soil science, soil maps and interpretation, landscape interpretation
PRBO (PRBO Conservation Science) [2]	Avian ecology, conservation and management, status of Sacramento River avifauna
California Department of Water Resources [3]	Fluvial geology, geologic maps, landscape interpretation
U.S. Bureau of Reclamation [1]	Land acquisition and riparian vegetation, savanna/grassland, and freshwater wetland restoration funding
Parrott Investment Company [4]	Llano Seco Ranch history and management, cooperative land management at Llano Seco
California Department of Fish and Game [3]	Rare, threatened and endangered species conservation, anadromous fish and fisheries science and conservation, law enforcement, land acquisition, and cooperative land management at Llano Seco
National Oceanographic and Atmospheric Administration, Fisheries [1]	Anadromous fish and fisheries science and conservation
Sacramento River Preservation Trust [2]	Sacramento River conservation issues
Ducks Unlimited [2]	Freshwater wetland and grassland habitat restoration funding
California Waterfowl Association [2]	Freshwater wetland habitat restoration funding
California Department of Parks and Recreation	Public use, law enforcement, ecology, land acquisition, facilities and access
Sacramento River Conservation Area Forum	Forum for public information

[1] Federal government.

[2] Private non-profit conservation organizations.

[3] State of California.

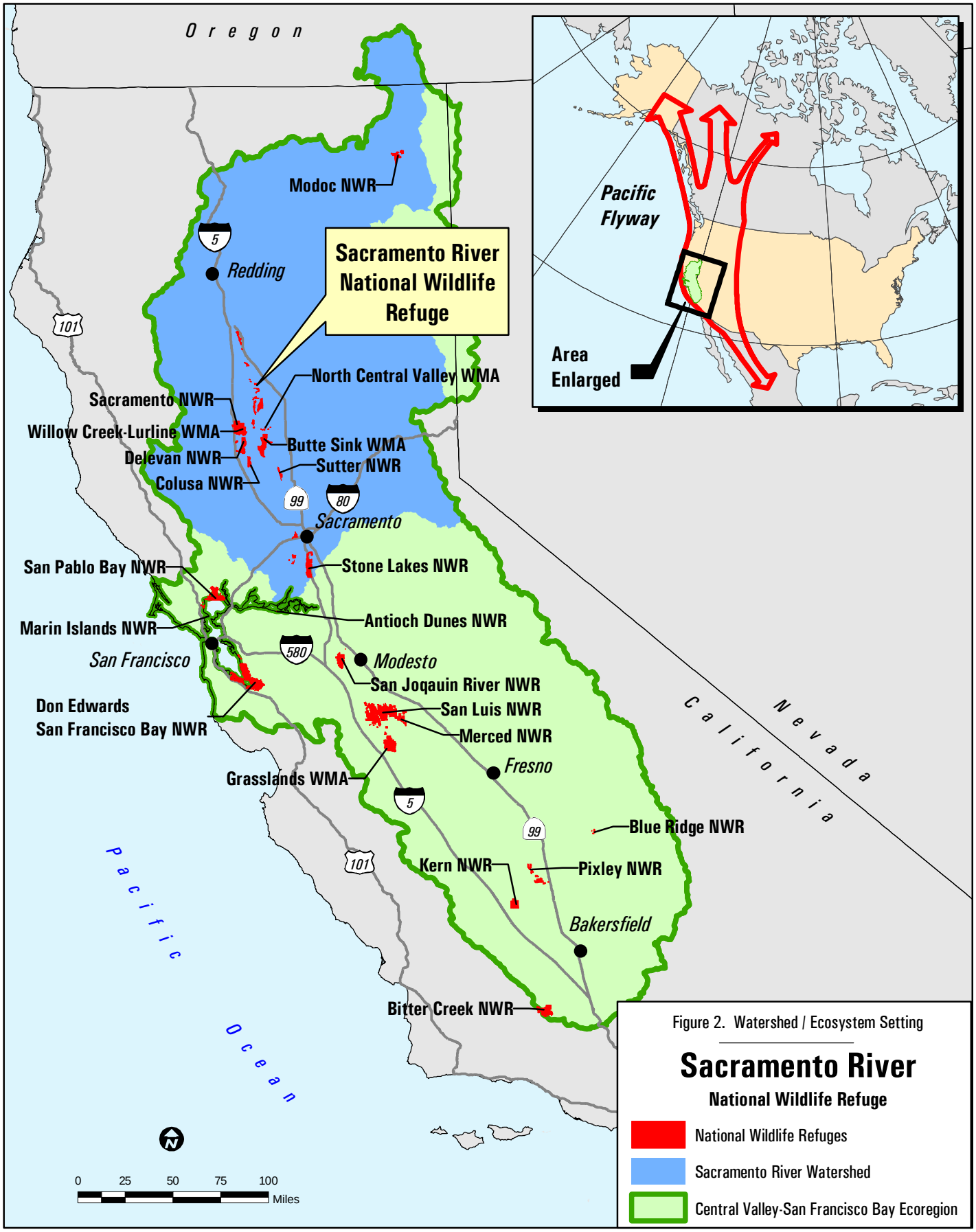
[4] Private

Ecosystem Context

The Great Central Valley consists of four physiographic regions: the Sacramento Valley, the San Joaquin Valley, the Tulare Basin, and the Sacramento-San Joaquin Delta (Warner and Hendrix 1985). The Sacramento River and the San Joaquin River watersheds drain into San Francisco Bay via the Delta (Figure 2). The Sacramento River is the largest river in California. Above Red Bluff, the Sacramento River forms a V-shaped canyon by down-cutting through the Cascade Mountain Range. Below Colusa, the river is completely confined within narrow channels by bank stabilization. The middle Sacramento River, which occurs between Red Bluff and Colusa, represents an alluvial river ecosystem that is characterized by the physical processes of flooding, erosion, deposition, and channel movement (i.e., sinuous meandering). Oxbow lakes and abandoned channels form when the sinuous loops of a meandering river are cut off from the main channel. Operation of Shasta Dam for water delivery and flood control has altered the frequency, duration, and magnitude of flooding on the Sacramento River floodplain. However, relatively moderate bank stabilization occurs between Red Bluff and Princeton and here alluvial river processes still influence portions of the landscape.

The Sacramento River floodplain is often described in three relative positions: the low, mid, and high floodplain. The low floodplain occurs next to the river, below the mean high water mark. This zone is characterized by frequent erosion and deposition of gravels and sands (point bars are common). The mid floodplain occupies the 100-year meander belt, above the ordinary high water mark. This zone is frequently flooded and is also characterized by erosion and deposition (steep vertical banks are common). Natural levees of great proportions developed in this zone. The high floodplain occurs in the 500-year meander belt. This zone is occasionally flooded and often located off of the main river channel.

Four geologic formations are identified for the middle Sacramento River (Harwood and Helley 1982). The Tehama Formation is the oldest and is relatively resistant to the erosive forces of the river (Buer et al. 1989). The Tehama Formation provides geologic control because river meandering is impeded. The Red Bluff and River Bank formations are younger and less resistant to erosion (Brice 1977; California Department of Water Resources 1994). The most extensive geology on the Sacramento River is associated with the Modesto Formation. The Modesto Formation generally occupies the mid floodplain and is characterized by unstratified Columbia loam soils with various amounts of sand and silt (California Department of Water Resources, Northern District 1980, 1984). Channel deposits, known as xerofluvial


Oregon
Modoc NWR
Redding
Sacramento River National Wildlife Refuge
North Central Valley WMA
Sacramento NWR
Willow Creek-Lurline WMA
Butte Sink WMA
Delevan NWR
Sutter NWR
Colusa NWR
Sacramento
San Pablo Bay NWR
Stone Lakes NWR
Antioch Dunes NWR
Marin Islands NWR
San Francisco
Modesto
San Joqauin River NWR
San Luis NWR
Merced NWR
Don Edwards San Francisco Bay NWR
Grasslands WMA
Fresno
Blue Ridge NWR
Kern NWR
Pixley NWR
Bakersfield
Bitter Creek NWR
Pacific Ocean
California
Nevada
Pacific Flyway
Area Enlarged
0 25 50 75 100
Miles
Figure 2. Watershed / Ecosystem Setting
Sacramento River
National Wildlife Refuge
National Wildlife Refuges
Sacramento River Watershed
Central Valley-San Francisco Bay Ecoregion

gravels and sands, and mixed alluvium characterize low floodplain geology (California Department of Water Resources 1994, Helley and Harwood 1985, Saucedo and Wagner 1992).

Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological process and biota. Habitat includes water, food, and areas or territories necessary for reproduction and survival. Therefore, riparian habitat includes the various forms of vegetation, wetlands, banks, and sand and gravel bars along the river. Middle Sacramento River vegetation includes herbaceous scrublands (mugwort, tarweed-buckwheat), willow scrub, cottonwood forest, mixed riparian forest, valley oak woodland and savanna, elderberry savanna, grassland, and freshwater wetlands. These wetlands include the main channel, tributaries, sloughs, abandoned channels, oxbow lakes, and ponds. The Geographic Information Center at California State University, Chico has developed vegetation categories, which the California Department of Water Resources is using. Since these are partners of Sacramento River Refuge, the Refuge is adopting their system. These categories are described in detail in Chapter 3.

A diversity of fish and wildlife are associated with the Sacramento River alluvial ecosystem. The Sacramento River is the only river in the Pacific with four runs of Chinook salmon: winter-run, spring-run, fall-run and late fall run (Figure 3). Anadromous fish use the tributaries, main channel, floodplain, sloughs, oxbow lakes, delta, estuary, bay, and open ocean at various points in there life history (Croot and Marcolis 1991). A wide range of migratory and resident songbirds and waterfowl use the Sacramento River riparian habitats because of the great diversity of soil substrate, vegetation structure, and types of wetlands. Neotropical migratory landbirds breed in various habitats along the river (Figure 4) and winter in Central America, while northern breeding waterfowl use flooded river habitats in the winter (Gaines 1977; Small et al. 2000).

Oxbow Lake Habitat
Photo by Joe Silveira

Figure 3. Life History Characteristics of Four Races of Chinook Salmon in the Central Valley of California.

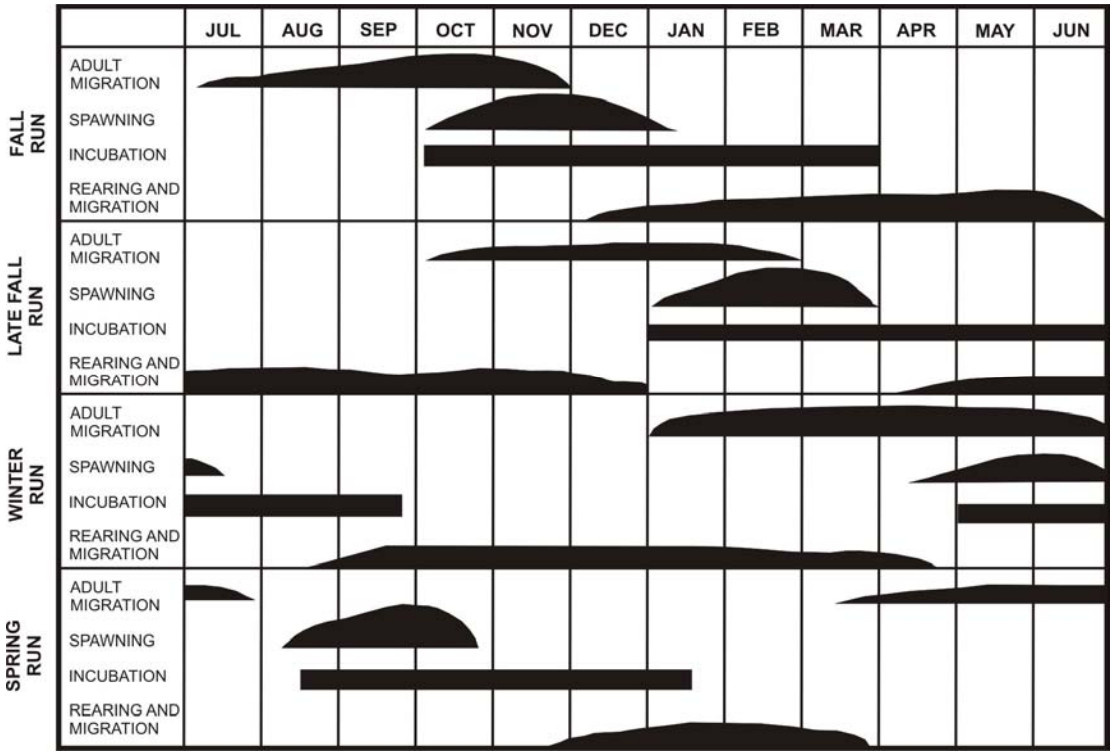
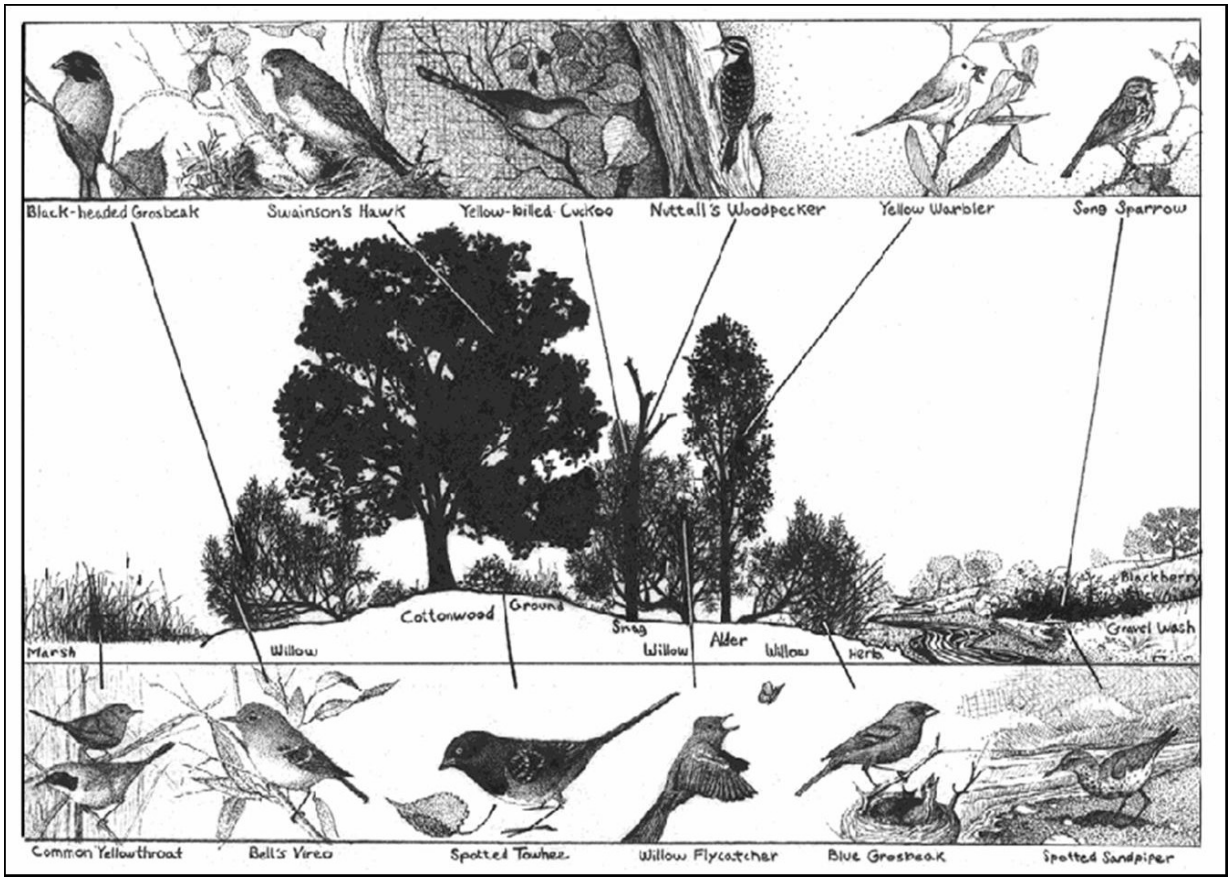


Figure 4. Riparian Bird Focal Species.



Riparian Habitat Joint Venture (2004) illustration depicting the diversity, complexity, and structure of riparian habitat. Note that the steep cut banks critical for establishing bank swallow colonies are not pictured. Illustration by Zac Denning.

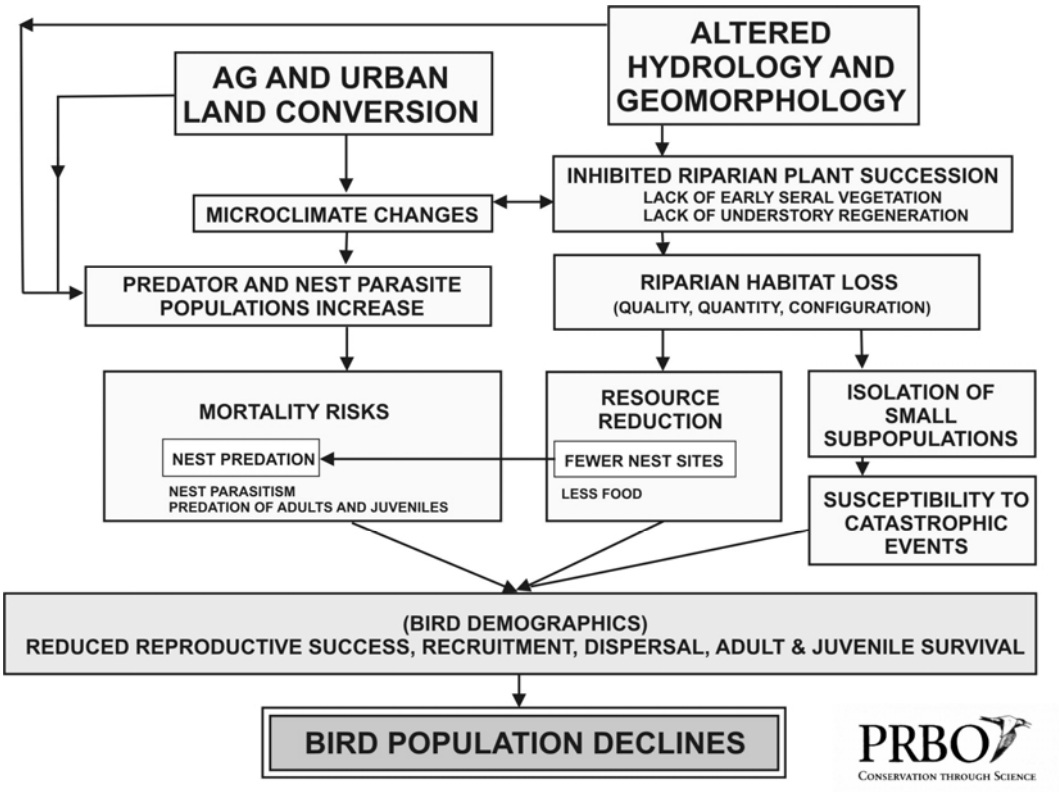
Threats and Opportunities

The Sacramento Refuge Complex serves as part of the last safety net to support biological diversity of the Great Central Valley. Only two percent of the original Great Central Valley riparian habitats remain. Forest clearing began in the mid 1800s along the Sacramento River (Katibah 1989; Scott and Marquiss 1989; Thompson 1961), first for dry land farming and later, for irrigated agriculture. Wood was used to power steamboats that carried agricultural products to San Francisco markets. Shasta and Keswick dams stored water for agriculture and urban uses, and provided flood control and hydrologic power. Construction of private and public levees and bank revetment (e.g., rip-rap) resulted in various degrees of channel constriction that separated the river channel from the floodplain (California Department of Water Resources, Northern District 1980, 1984).

While little remains of the original Sacramento River riparian habitats, bank stabilization, water diversion projects, and other activities that cause fragmentation of riparian habitats and loss of connectivity between the channel and floodplain continue. Runoff of sediments, pesticides, and herbicides also result in reduced ecologic functions and habitat loss of aquatic resources. These have the potential to cause further degradations in habitat quality. The cumulative effects of land and water resource development activities have caused simplification of the remaining wildlife habitats within the ecosystem, resulting in both direct and indirect negative impacts to habitat and fish and wildlife populations.

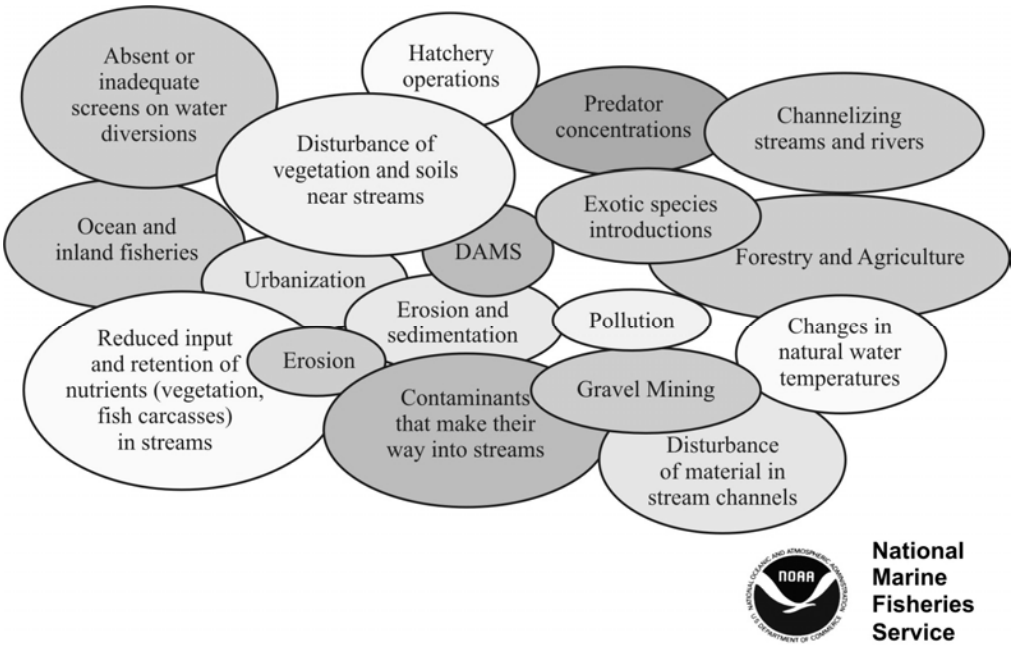
The species most adversely affected are those dependent upon the Sacramento River and riparian habitats during all or a portion of their life history (National Oceanic and Atmospheric Administration–National Marine Fisheries Service 1997; Riparian Habitat Joint Venture 2004). Riparian forest and habitat succession have been attenuated by dams and the resulting altered hydrograph, bank protection, and deforestation. This has led to severely reduced diversity, quantity, and quality of habitat for breeding migratory and resident birds (Riparian Habitat Joint Venture 2004; Small et al. 1999, 2000). Poor habitat complexity and structure have eliminated or reduced nesting habitat while increasing nest parasite and predator populations (Figure 5). Rip-rap and levees have reduced the number and size of bank swallow colonies along the middle portion of the Sacramento River. The least Bell's vireo no longer breeds in northern California, and the warbling vireo has been extirpated (completely eliminated) as a breeding bird from the middle Sacramento River (Grinnell 1915, 1918, Gaines 1974, 1977). The western yellow-billed cuckoo is threatened by loss of mature cottonwood forests adjacent to mature mid-story habitats (Gaines 1974). Species dependent on mature valley oak forests, such as the acorn woodpecker, are absent from the majority of their historic range due to the near complete loss of this habitat type (refer to Holland and Roye 1989; Holmes et al. 1915; and, Bureau of Soils 1913 for historic distribution of valley oak forest and savanna/Columbia soil in the Sacramento Valley).

Figure 5. Potential Effects of Altered Hydrology on Breeding Bird Populations.



Chinook salmon and steelhead (salmonids) use the channel for migration and spawning. Dams, bank revetment, and deforestation have resulted in declining anadromous salmonid populations (NOAA-NMFS 1997), (Figure 6). Dams block fish passage and prevent spawning gravel from moving downstream. During periods of excessive runoff, silt accumulates in gravel, which starves eggs of oxygen. Rip-rap and forest clearing near the channel reduces the amount of large woody debris (LWD) that enters the channel (USFWS 2000). LWD is an important substrate for a fishery food-web. LWD also widens the channel and reduces down-cutting, creates aquatic habitat diversity, provides escape cover, and traps spawning gravel and fish carcasses (USFWS 2000). Salmonid fish carcasses are important sources of marine derived nitrogen which is critical to the productivity of the Sacramento River ecosystem. Forest clearing also reduces the number of overhanging trees that create Shaded Riverine Aquatic Habitat, which reduces water temperatures.

Figure 6. Contributing Factors for the Decline in Anadromous Salmonids of the Pacific (NOAA-NMFS).



Good opportunities for riparian land acquisition and restoration exist primarily within flood-prone agricultural lands located in the lower portions of the floodplain. The relatively high costs of maintaining these orchards have made it beneficial for farmers to sell these lands and concentrate their agricultural operations above the lower floodplain. Some farmers have noticed reduced flood impacts to orchards located behind restoration sites, where snags, logs, brush, gravel, and sand are filtered by the restoration site.

Conservation Priorities and Initiatives

The conservation priorities for federally listed endangered and threatened species and migratory birds that occur at Sacramento River Refuge are frequently reinforced by the designation of critical habitat, recovery plans, and conservation plans. A draft recovery plan has been completed for the Sacramento River winter-run Chinook salmon (NOAA-NMFS 1997), and the Refuge lies within the designated critical habitat for Sacramento River winter-run Chinook salmon (federally listed endangered species), Central Valley spring-run Chinook salmon (federally listed threatened species), and Central Valley, California steelhead (federally listed threatened species). A recovery plan has also been completed for the Valley elderberry longhorn beetle (federally listed threatened species). Population and habitat conservation initiatives and plans exist for migratory waterfowl (North American Waterfowl Management Plan 1986, North American Waterfowl and Wetlands Conservation Act of 1986; Central Valley

Habitat Joint Venture 1990) and migratory and resident landbirds (Riparian Habitat Joint Venture 2004). Appendix M contains a list of other laws and executive orders that may affect the CCP or the Service's implementation of the CCP. It also contains an overview of polices and plans that are relevant to Sacramento River Refuge.

The implementation of conservation plans requires the cooperation of a variety of Federal, State, local, and private interests. Most conservation implementation projects involve the local community, including farmers, farm suppliers, and schools. Local support is essential, not only to facilitate the conversion of agricultural land to wildlife habitat, but also for the long-term interest of Refuge conservation programs. Therefore, the Refuge and its partners engage the local community whenever possible. Some of our partners are listed in Table 2.

Wilderness Review

As part of the CCP process, lands within the boundaries of Sacramento River Refuge were reviewed for wilderness suitability. No lands were found suitable for designation as Wilderness as defined in the Wilderness Act of 1964.

Sacramento River Refuge does not contain 5,000 contiguous roadless acres, nor does the Refuge have any units of sufficient size to make their preservation practicable as Wilderness. The lands of the Refuge have been substantially affected by humans, particularly through agriculture and regulation of the flows of the Sacramento River. As a result of the extensive modification of natural habitats and ongoing manipulation of natural processes, adopting a wilderness management approach at the Refuge would not facilitate the restoration of a pristine or pre-settlement condition, which is a goal of wilderness designation.

Acorn Woodpecker
Photo by Steve Emmons

Refuge River Jurisdiction

Navigability and jurisdiction on and under water bodies, including lakes, rivers, and streams, is a complex and confusing issue. In California, the precedents have been established through a combination of legislation and court decisions.

The following text in italics is excerpted in part from a Formal Opinion of State Attorney General Dan Lungren dated November 12, 1997 (No. 97-307):

> *The state (in Harbor and Navigation Code Section 240) recognizes the paramount authority of the United States over navigable waters and applies its regulations to navigation on such waters only insofar as the regulations do not conflict with the admiralty and maritime jurisdiction and laws of the United States. The public's right to use navigable waterways includes their use for boating and recreation; indeed, waters capable of use for recreational boating are deemed navigable. (People ex rel. Baker v. Mack (1971) 19 Cal. A; 3d 1040.). The public's right to use navigable waters for boating and recreation is not only guaranteed by the state Constitution, it is also guaranteed by the Legislature (Gov. Code Section 39933), and the right is inherent in the public trust under which the navigable waters are held. (See Marks v. Whitney (1971) 6 Cal.3d 251; People b. California Fish Co., supra, 166 Cal. At 598-599; 79 Ops. Cal Atty. Gen.133, 135-146 (1996).)*

"The State of California owns and administers several different types of interests in rivers and streams with the state's borders by virtue of being the sovereign representative of the people. These rights are the property of the state, and the state's powers with respect to these property rights are similar in certain ways to the rights of private property owners, but are governed by the law of public trust. The Public Trust Doctrine, as it affects these rights, is designed to protect the rights of the public to use watercourses for commerce, navigation, fisheries, recreation, open space, preservation of ecological units in their natural state, and similar uses for which those lands are uniquely suited" (California's Rivers, A Public Trust Report, California State Lands Commission 1993).

The state lays claim to the beds of all nontidal, navigable rivers and streams up to the ordinary low water mark. In addition, the state claims a right often termed a "public trust easement" in the area between the ordinary low water mark and ordinary high water mark.

The Service has statutory authority under the Improvement Act to regulate activities that occur on water bodies "within" refuge units. The Service, in terms of its refuge administration regulations, has effectively defined this authority to apply to areas the United States holds in fee or to the extent of the interest held by the United States.

Federal Courts have clarified these issues in regards to Federal agencies (i.e., National Parks, National Forests, and National Wildlife Refuges) that own and manage lands that encompass portions of water bodies (lakes or rivers). The Federal Courts have consistently maintained that Federal agencies have jurisdiction over recreational uses on these water bodies when the water body is integral to the primary purposes for which the park, forest, or wildlife refuge was established.

For example, in the U.S. v. Hells Canyon Guide Service case, the District Court maintained that the Property Clause of the Constitution gave the government power "to regulate conduct on non-federal land (the Snake River that runs through the National Forest) when reasonably necessary to protect adjacent Federal property or navigable waters." In addition, this case stated "Congress' power over Federal lands includes the authority to regulate activities on non-federal waters in order to protect the archaeological, ecological, historical and recreational values on the lands" (United States v. Hells Canyon Guide Service; U.S. District Court of Oregon, Civil No. 79-743; 5-6; 1979).

In the court decision in U.S. v. Brown, the Circuit Court wrote, "…we view the congressional power over Federal lands to include the authority to regulate activities on non-federal public waters in order to protect wildlife and visitors on the lands" (United States v. Brown 552 F.2d 822; 8th Cir. 1977).

Finally in the U.S. v. Armstrong case the Circuit Court upheld a conviction against Armstrong and Brown who were conducting a commercial business without a permit within a National Park. In this case, the Circuit Court relied on a U.S. Supreme Court precedent stating, "In Kleppe v. New Mexico, 426 U.S. 529, 546(1976), the Supreme Court held that the Congress may make those rules regarding non-federal lands as are necessary to accomplish its goals with respect to Federal lands" (United States v. Armstrong; No. 99-1190; 8th Cir. 1999).

The meandering nature of the Sacramento River has played a critical role in establishing the Refuge and is a necessary component for the Refuge to meet its purposes. Moreover, regardless of jurisdiction,

the Refuge's first priority is to work with the State of California and local counties to ensure that public trust rights are protected while meeting the Refuge goals and objectives.

In closing, it is the policy of the Sacramento River Refuge to recognize the rights of the public to use, consistent with State and Federal laws, the waters below the ordinary low water mark and the "public trust easement" in the area between the ordinary low water mark and ordinary high water mark. Accordingly, the public uses in these areas will be outlined and evaluated in this CCP, the Environmental Assessment, and associated Compatibility Determinations.

California hibiscus
Photo by Joe Silveira